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Fresh Vegetable Packing Costs for Six Small Cooperatives

Abstract

Fresh Vegetable Packing Costs for Six Small Cooperatives

Edgar L. Lewis, Agricultural Economist
Cooperative Marketing Division
Agricultural Cooperative Service (ACS)
U.S. Department of Agriculture

An analysis of operations of six small fresh vegetable cooperatives shows key cost variables and operating costs of cooperative packing facilities. Average per unit costs are developed for total operation, packingline, and administrative functions. The study also examines other factors that influence packingline costs.

Keywords: cooperatives, vegetables, key cost variables, operating costs, packingline costs, per unit costs.

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Preface

Small-scale fresh vegetable marketing cooperatives are gaining in importance as farmers turn to alternative crops for new sources of farm income. The success of these cooperatives as business operations will depend on management's ability to control costs and operate efficiently. To do this, managers must have basic tools to measure costs and monitor performance.

The purpose of this study is to identify the key cost variables in operating a small fresh vegetable packingshed facility, determine the operating cost, and standardize those costs where possible so that cooperative managers can use them to evaluate the performance of the business operation. This study also examines the operating cost of packing facilities, with emphasis on the packingline operation, especially labor costs. The study was limited to those small-scale fresh vegetable cooperatives with sales of less than $5 million.

In preparing this report, an onsite survey was conducted of nine relatively homogeneous vegetable cooperatives to determine the key cost variable items and actual cost of operating a cooperative packing facility. Information was also collected on operating procedure, types of produce handled, physical facilities and equipment, and 1984-86 financial statements. However, only six cooperatives provided sufficient data to be of use to the study.

Special emphasis is given in this report to the packingline operation. It is intended to assist cooperative managers in monitoring the performance of their cooperatives and will be used by ACS staff to develop feasibility studies.

Contents

Highlights

Over the past several decades, farmers with both large and small acreage have turned to fruits and vegetables as an alternative crop enterprise. This increased production of fruits and vegetables in some nontraditional regions of the country has prompted the formation of new marketing cooperative associations.

Many marketing associations were formed to provide growers the opportunity to pool their products to take advantage of economies associated with size, which would result in lower packing and transportation costs. However, some associations went out of business because of insufficient volume of a quality product, poor management, and high operating cost.

The six cooperatives included in this study operated permanent packingshed facilities. Three owned or were in the process of purchasing facilities, while the remaining three rented facilities. These facilities were used to grade, pack, and store patrons' produce. A section of each building was designated as a permanent or temporary office area.

The cooperatives packed a combination of four commodities: bell peppers, tomatoes, cucumbers, and cabbage. Other commodities were field-packed and delivered to the packingshed to be sold. During 1984-86, bell peppers were the leading commodity, representing 48-59 percent of the total volume. Five of the six handled two or more of these commodities, with an average pack-rate-per-hour range from 150 to 1,325 boxes.

The cooperatives varied in size regarding volume of produce handled and in method of operation. Based on a 3-year average, 1984-86, the volume of produce packed per individual cooperative ranged from a low of 24,009 boxes to a high of 403,507. The low of 24,009 boxes represented a 26-percent shed utilization rate compared with about 81 percent for the cooperative that averaged 403,507 boxes over the 3-year period. The six cooperatives differ in method of operating. Three cooperatives had a full-time facility manager and operated year round. The other three had part-time managers that divided their time between administrative functions and the packingline operation.

The costs associated with operating a fresh vegetable cooperative packingshed facility are divided among three categories: packingline, administrative, and marketing. Each of these three categories has several detail cost variables associated with its operation.

Although important, marketing cost is not included in the study because of unavailable data. Therefore, total facility operating costs will include packingline and administrative operations.

Total per unit operating cost for individual cooperatives ranged from a low of $1.17 in 1984 to a high of $5.72 in 1986, while the total average operating cost per unit for the six cooperatives ranged from $1.80 to $1.88.

Packingline cost variables are directly associated with grading, packing, preparing, and delivering produce to the onsite cooler or refrigerated truck. The key variables for a packingline operation are packingline labor cost, utilities, marketing materials (containers), and overhead. For the six

cooperatives, these items averaged 81-85 percent of total packingshed operating cost and had a range of 65 to 92 percent for the 3 years. On a per unit basis, packingline costs averaged between $1.522 to $1.533 and ranged from a low of $0.8l5 to a high of $3.9l6.

Administrative costs are those associated with the total management function of the cooperative, excluding manufacturing and production. In 1984-86, administrative costs averaged 15-l9 percent of total operating costs and a range among the six cooperatives between 7.6 percent to 34.5 percent. On a per unit basis, administrative costs averaged between $0.27 and $0.36 and ranged from $0.l54 to $1.799.

Income generated by cooperatives to pay packingline and administrative costs comes from packing fees. In 1984-86, the average fee for all commodities ranged from $2.11 to $2.l5, while the average per unit operating cost ranged from $1.80 to $1.88.

Standards for measuring cooperative performance have been developed and presented in the report. Standards include cost distribution components, per unit cost, and productivity per dollar and per hour of labor. Although the measures may be limited, cooperative managers can use them to evaluate the business operation.

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Agricultural Economist

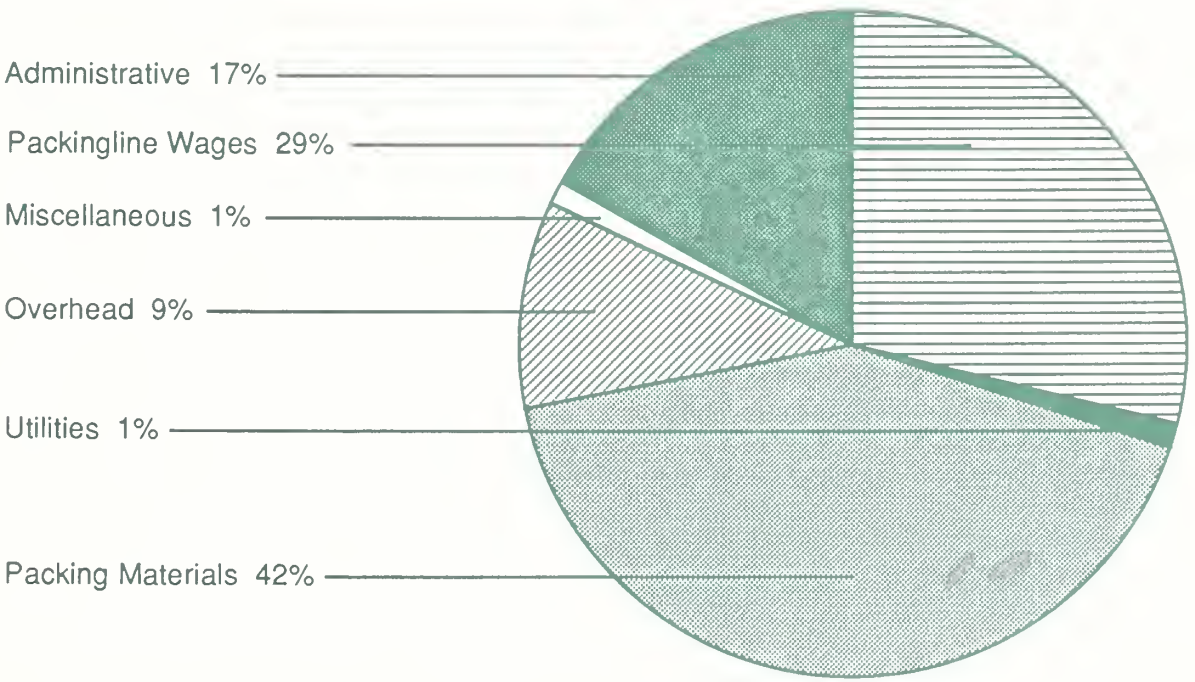
Key Cost Variables

Many cost variables are involved in operating a small fresh vegetable cooperative packing facility. Table 1 shows a list of cost variables developed from 1984-86 financial operating statements of six cooperatives. The operating statements contained several items that were unique to each cooperative and represented small cost values. Those items were combined and classified as miscellaneous. The cost variables are divided into packingline and administrative categories.

Key variables that represent a higher percentage of total cost have a greater impact on a cooperative's operations and, therefore, should be monitored closely by management. Figure 1 shows a 3-year (1984-86) average distribution of the major groups of variable costs.

The percent distribution of cost variables will change from year to year, but the rank of importance to total cost should remain as shown in figure 1. This is true with the six cooperatives surveyed. This information will help managers

Figure 1—Distribution of Cost Components 3-year, 1984-86



recognize where their cost dollars are being spent and the level of expenditures.

Total Facility Operating Cost

The costs associated with operating a fresh vegetable cooperative packingshed facility are divided among three categories: packingline, administrative, and marketing. Each of these three categories has several detailed cost variables associated with its operation.

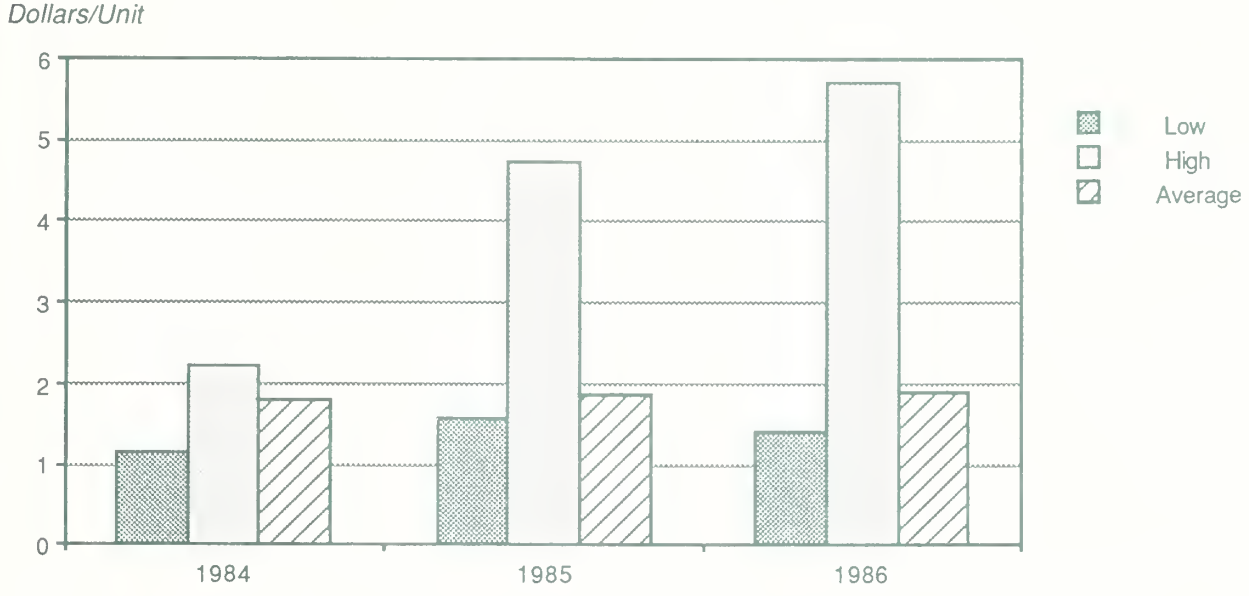
Although important, marketing cost is not included in the study because of unavailable data. The majority of the cooperatives used broker-agents to sell their produce. In some cases, marketing cost information was not given to the cooperatives. Therefore, for the purpose of this study, total facility operating costs will

Table 1—Average operating cost for six fresh vegetable cooperative packingshed operations[1]

Item	Average cost			Cost distribution		
	1984	1985	1986	1984	1985	1986
	Dollars			*Percent*		
Packingline costs:						
Wages & FICA	78,269	65,213	65,878	32.41	27.74	26.52
Vegetable inspector	810	1,126	689	0.34	0.48	0.28
Utilities	2,331	3,476	3,160	.96	1.48	1.27
Materials						
Containers	95,088	94,374	98,886	39.37	40.15	39.81
Marketing supplies	5,111	3,718	4,579	2.12	1.58	1.84
Overhead						
Repair & maintenance	6,322	5,065	6,505	2.62	2.15	2.62
Cost of using building[2]	8,475	7,342	7,976	3.51	3.12	3.21
Equipment depreciation	6,774	6,563	9,437	2.80	2.79	3.80
Equipment rental	0	2,670	649	0	1.14	.26
Miscellaneous	2,167	4,509	3,252	.90	1.92	1.31
Total packingline costs	205,347	194,057	201,010	85.02	82.55	80.92
Administrative costs:						
Salaries & FICA[3]	21,148	24,490	27,598	8.76	10.42	11.11
Insurance	2,615	3,407	4,573	1.08	1.45	1.84
Taxes & licenses	750	616	1,009	.31	.26	.41
Telecommunication	3,147	2,845	3,235	1.30	1.21	1.30
Audit & legal	1,948	2,628	2,826	.81	1.12	1.14
Interest payments	648	435	1,435	.27	.19	.58
Miscellaneous	5,922	6,602	6,733	2.45	2.81	2.71
Total administrative costs	36,178	41,023	47,408	14.98	17.45	19.08
Total operating costs	241,525	235,080	248,418	100.00	100.00	100.00
	Number					
Average pack-out (boxes)	134,457	126,576	132,054	—	—	—
	Percent					
Average shed utilization	63	64	62	—	—	—

— = Not applicable.
[1]Data based on financial statements provided by cooperatives and reflects 5 cooperatives operating in 1984 and 6 in 1985 and 1986.
[2]Reflects depreciation on buildings or rent paid for use of facilities.
[3]Reflects 50 percent of manager's time on administrative activities and 50 percent on selling activities, if not reported separately by the cooperative.

Figure 2—Range and Average Per Unit Total Operating Cost



include packingline and administrative operations. These two areas reflect costs incurred by the cooperative when the produce is delivered to the packing facility, graded, packed, and delivered to an onsite cooler or refrigerated truck.

Based on the data presented in table 1, packingline costs represented 81-85 percent of the total facility operating cost, while administrative costs accounted for 15-19 percent. Therefore, the major part of the report will focus on the packingline costs, with emphasis on labor.

Table 2 shows the range between individual cooperatives and average per unit operating cost for each key cost variable. Based on the data presented in table 2 and figure 2, total operating cost for individual cooperatives ranged from a low of $1.17 in 1984 to a high of $5.72 in 1986. Also presented in table 2 and figure 3 are total average operating cost per unit for all six cooperatives ranging from $1.80 to $1.88, which is composed of packingline ($1.52 to $1.53) and administrative cost ($0.27 to $0.36).

Average operating cost and its range should be of interest to cooperative managers. Cooperatives with operating costs significantly above the average should evaluate their procedures.

Date show that operating cost for one cooperative in the study seems to be considerably higher than the other five cooperatives and the group average. However, the cooperative was allowed to remain in the study to highlight problems associated with operating small fresh vegetable cooperatives. Also, managers of new cooperatives would appreciate the need to monitor costs (fig. 4).

Operating a packing facility is a competitive undertaking.Cooperatives and noncooperative firms compete for the same business and basically receive the same prices for their produce. The firm that operates the most efficiently has the greatest opportunity for survival.

Table 2—Range and average costs per unit for six fresh vegetable cooperative packingshed operations[1]

Item	Range						Average per unit cost		
	1984		1985		1986		1984	1985	1986
	Low	High	Low	High	Low	High			
					Cents				
Packingline costs:									
Wages & FICA	0.327	0.943	0.297	1.148	0.387	1.439	0.582	0.515	0.499
Vegetable inspector	0	.042	0	0.059	0	0.041	.006	.009	.005
Utilities	.012	.041	.011	.206	.008	.140	.017	.027	.024
Materials									
Containers	.307	.974	.489	1.029	.492	1.069	.707	.746	.749
Marketing supplies	.006	.053	.006	.040	.006	.058	.038	.029	.035
Overhead									
Repair & maintenance	.002	.058	.026	.102	.005	.565	.047	.040	.049
Cost of using building[2]	.019	.101	.025	.097	.038	.106	.063	.058	.060
Equipment depreciation	0	.144	0	.113	.021	.584	.050	.052	.071
Equipment rental	0	0	0	.549	0	.106	0	.021	.005
Miscellaneous	0	.054	0	.086	.004	.133	.016	.036	.025
Packingline cost per box	.815	1.879	1.276	3.349	1.165	3.916	1.527	1.533	1.522
Administrative costs:									
Salaries & FICA[3]	.049	.345	.220	.717	.067	.905	.157	.193	.209
Insurance	.005	.032	.006	.074	.005	.078	.019	.027	.035
Taxes & licenses	.003	.009	.002	.014	.003	.034	.005	.005	.008
Telecommunication	.009	.062	.009	.100	.007	.178	.023	.022	.024
Audit & legal	0	.035	.001	.121	.001	.088	.014	.021	.021
Interest payments	0	.010	0	.089	0	.325	.005	.003	.011
Miscellaneous	.018	.175	.023	.302	.018	.252	.044	.052	.051
Administrative cost per box	.154	.656	.207	1.405	.206	1.799	.269	.324	.359
Total average cost per box	1.174	2.219	1.565	4.754	1.431	5.715	1.796	1.857	1.881
					Number				
Average pack-out (boxes)	23,295	312,820	29,200	398,403	15,460	499,299	134,457	126,576	132,054
					Percent				
Average shed utilization	52	85	48	80	26	100	63	64	62

[1]Data based on financial statements provided by cooperatives and reflects 5 cooperatives operating in 1984 and 6 in 1985 and 1986.
[2]Reflects depreciation on buildings or rent paid for use of facilities.
[3]Reflects 50 percent of manager's time on administrative activities and 50 percent on selling activities, if not reported separately by the cooperative.

The basic objective of a cooperative is to improve the economic position of farmers. To the users (members and buyers), the key elements to performance involve whether the cooperative provides their desired product and service mix at a price they consider fair and comparable to the competition.

When operating costs are out of line with competitors, cooperative members may be receiving less than a fair return for their produce. Managers should evaluate all cost items to determine which are out of line, understand why, and take the appropriate corrective action.

Figure 3—Average Per Unit Operating Cost

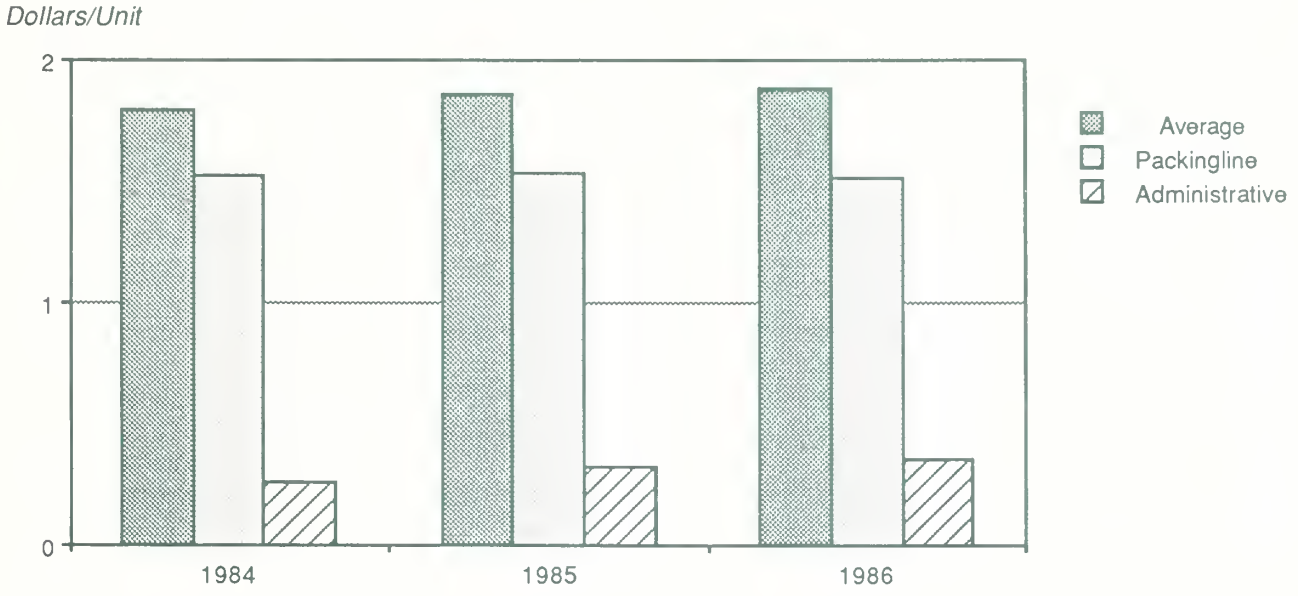


Figure 4—Average and Per Unit Operating Cost

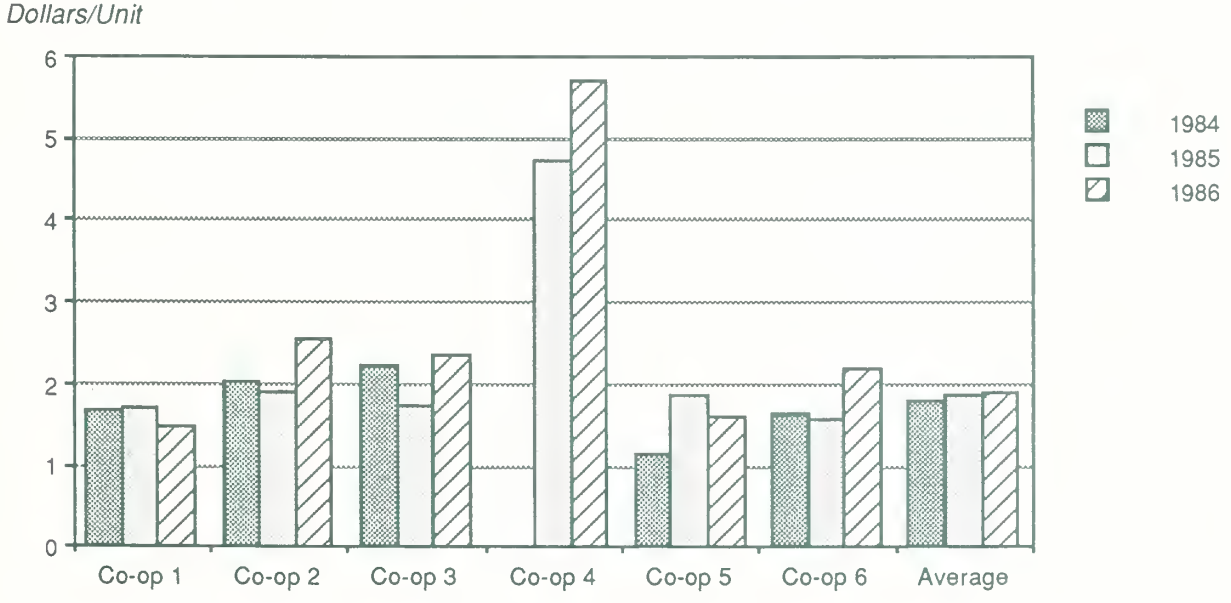


Figure 5—Share of Packingline Operating Cost, Range, and Average

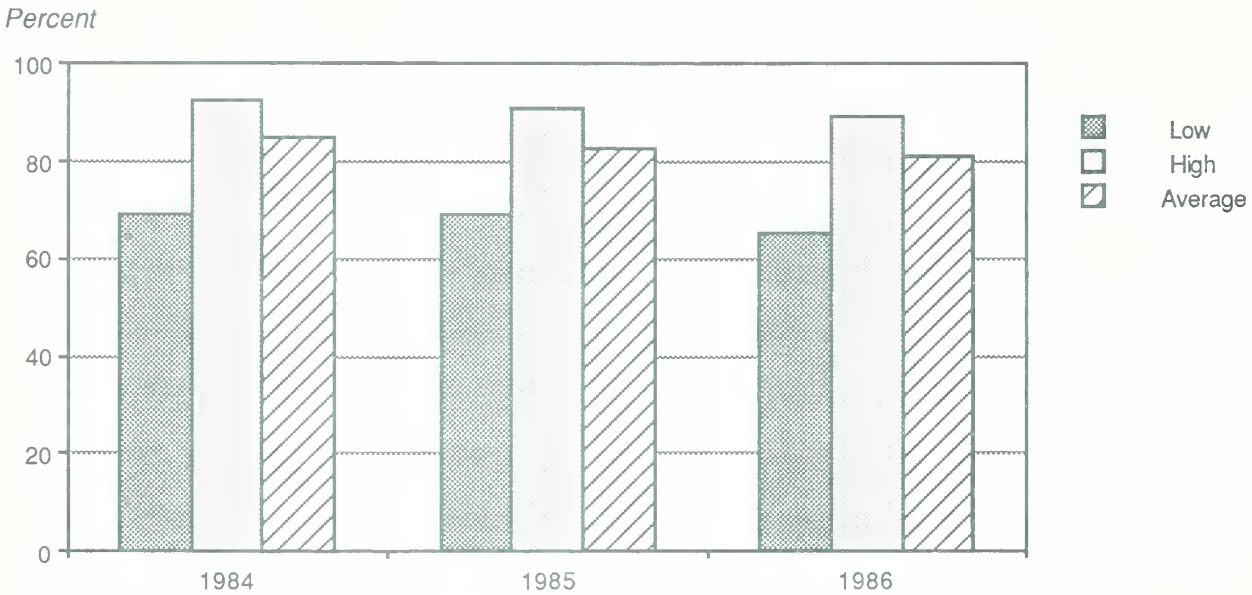
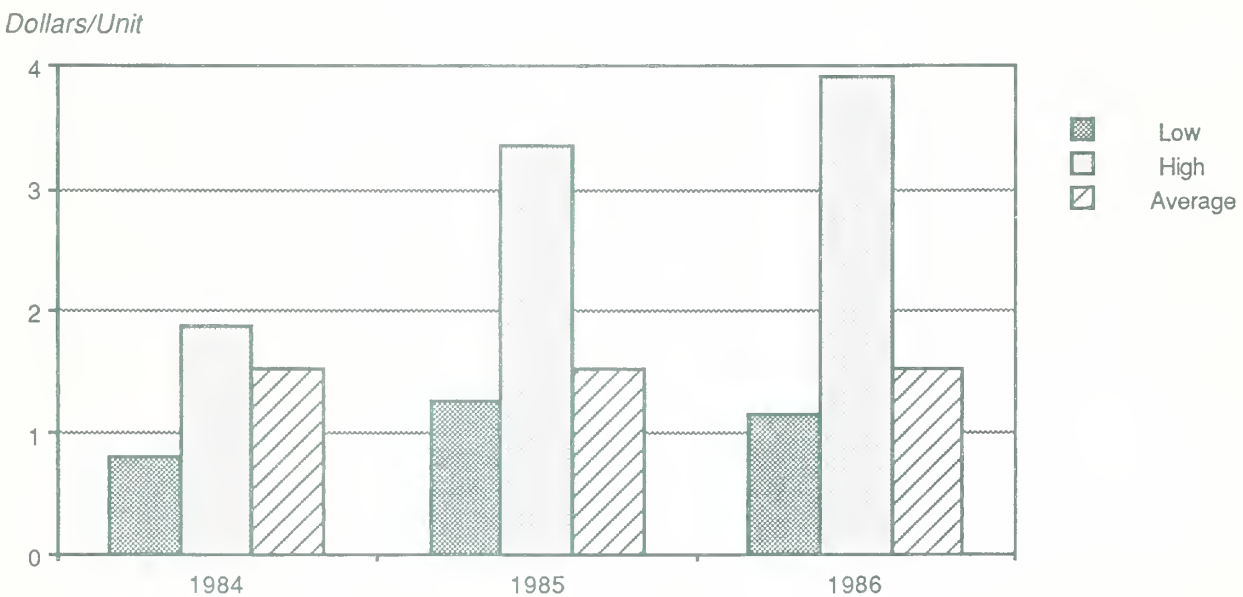


Figure 6—Per Unit Packingline Operating Cost, Range, and Average



Packingline Costs

Cooperatives used two methods of operating packinglines. One method commonly used by the majority of the cooperatives was for the manager to hire a packingline foreman and laborers to grade and pack patrons' produce. Contracting services was the other method. Several cooperatives hired broker-agents to grade and pack patrons' produce based on a per unit fee. The agent hires packingline laborers and is responsible for their wages. These agents usually operate two or more packing facilities at the same time and thus are able to improve labor efficiency.

Packingline cost items are directly associated with grading, packing, preparing, and delivering produce to the onsite cooler or refrigerated truck. Again, as shown in tables 1 and 2, key cost variables for a packingline operation are packingline labor cost (wages and FICA), utilities, marketing materials (containers), and overhead (repairs and maintenance, cost of using building, equipment depreciation, and equipment rental). For the six cooperatives surveyed, these items averaged 81-85 percent of total packingshed operating cost, and had a range of 65 to 92 percent for the 3 years. On a per unit basis, packingline costs averaged between $1.522 to $1.533, and ranged from a low of $0.815 to a high of $3.916 (table 2 and figs. 5-6).

These are cost variables that cooperative managers need to focus on to bring cost in line with the competition. Marketing materials (containers) and packingline labor cost represent the major portion of packingline operating cost, averaging between 68-74 percent of total operating costs and averaging $1.29-$1.33 per unit.

Packing Materials

Packing containers (boxes) and other supplies used in preparing produce for shipping are considered packing materials. Packing containers consisted of 20- and 30-pound boxes, except in instances where sacks were used for cabbages. Packing containers represented the largest single variable cost item, at about 42 percent of the packingshed total operating cost and about 50 percent of the packingline operating cost. Average cost per container was $0.71-$0.75 for the 3-year period (table 2). The range in container cost between cooperatives was a low of $0.31 to a high of $1.07. In some cases, cooperatives reduced their container per unit cost by purchasing in bulk, through other cooperatives, or by buying used containers. Several cooperative managers indicated that they were able to save by shopping around. However, care should be taken not to give up too much quality to save a few cents. A quality container is required for shipping produce over long distances.

Labor Wages and FICA

Labor wages and FICA paid to packingline workers is a key cost variable.

Wages and FICA accounted for 26-32 percent of total operating cost of the six small vegetable cooperatives (see table 1), at an average per unit (box) labor cost of between $0.50 and $0.58. However, this is the area where management has the greatest control but also is the area where costs can get out of hand; hence, the wide range in packingline labor cost per box for the six cooperatives, with cost from a low of $0.33 to a high of $1.44 (table 2).

Overtime and multishifts may be a contributing factor to increasing the per unit packingline operating cost. This is especially true if the cooperative is required to pay higher wage rates per hour for different work schedules. If overtime and/or multishifts are common, the cooperative should think about expanding the existing line or adding another one.

Management will want to know what size labor force is needed and what wage rates are required to be competitive. The answers depend on many factors, including the quantity and quality of produce delivered to the packingshed, price received, equipment, and type of facility.

An economic-engineering methodology for a permanently sited small fresh vegetable packingline was developed to determine the cost

Table 3—Estimated packingline labor costs per unit of output based on an economic-engineering methodology study[1]

Workers	Hourly rate unit	Total annual units	Annual cost per unit of output Economic-engineering methodology			
			10,000 units	25,000 units	50,000 units	100,000 units
	Dollar		*Cents*			
On site (8):						
Feeder-receiving belt (1)	4	(2)	0.0444	0.0445	0.0445	0.0444
Packers (3)	12	(2)	.1332	.1334	.1334	.1333
Conveyor (1)	4	(2)	.0444	.0445	.0445	.0444
Stackers (2)	8	(2)	.0888	.0890	.0890	.0888
Cartonmakers (1)	4	(2)	.0444	.0445	.0444	.0444
Subtotal	32	(3)	.3552	.3559	.3558	.3553
Full season (1):						
Supervisor	7	[4]9,100	.9100	.3640	.1820	.0910
Total	39		1.2652	.7199	.5378	.4463

[1]Table from USDA-AMS Marketing Research Report Number 1146, July 1986.
[2]Vary with level of output and reflected in per unit costs.
[3]Will vary with output:
10,000 units cost $3,552 for onsite labor (111 hrs)
25,000 units cost $8,896 for onsite labor (278 hrs)
50,000 units cost $17,792 for onsite labor (556 hrs)
100,000 units cost $35,552 for onsite labor (1,111 hrs)
[4]Full-season employees are to be assured 1,000 hours per year.

of operation for various units of output. The study was sponsored by the Agricultural Marketing Service (AMS), U.S. Department of Agriculture (USDA), and conducted at Virginia Polytechnic Institute. As shown in table 3, the packingline would require a crew of nine workers, but it could be operational on a limited basis with seven. One worker would be a full-time supervisor. The other eight would work along the packingline; assemble cartons, moving the cartons either into refrigerated storage or into a refrigerated vehicle; and load vehicles.

Even though the economic-engineering methodology model packingline required nine workers for a 10,000- to 100,000-unit operation, cooperatives reported using 20-80 workers per day. In some cases, more than one packingline was in operation. A large number of workers may be needed on certain days due to the inconsistency in delivery of produce to the packingshed. Though the number of workers employed at the packingline differs from the model, the economic-engineering model can be used to measure labor productivity.

The information presented in table 3 identifies the number of duty stations on the packingline and estimated per unit labor cost at various levels of annual output. Based on the economic-engineering methodology, labor costs remain about the same at $0.35 per unit at each level of output for the eight onsite workers. Labor cost per unit decreases as the level of output increases when the supervisor's wages are included.

Table 4 shows the range and average productivity of labor for the six small fresh vegetable cooperatives in 1984-86, compared with a permanent onsite packingline economic-engineering model. Labor productivity is based on the number of units packed, individual work-hours utilized, and wage rates per hour, including FICA benefits.

Data show that the hourly wage rates for the cooperatives are less than those projected for

Table 4—Comparison of labor cost and utilization for the six cooperatives, range and average with an economic-engineering model packingshed operation[1]

Item	Range						Average for six cooperatives			Economic-engineering methodology Annual levels of output			
	1984		1985		1986								
	Low	High	Low	High	Low	High	1984	1985	1986				
Units packed (boxes):	23,295	312,820	29,200	398,403	15,460	499,299	134,457	126,576	132,054	10,000	25,000	50,000	100,000
Labor cost (dol):													
Packingline workers and supervisor	7,607	173,524	11,383	175,842	6,934	193,087	78,269	65,213	65,878	12,652	17,996	26,892	44,652
Average wage rates (dol/hr):													
Packingline workers and supervisor	3.35	4.49	3.35	4.00	3.35	4.25	3.51	3.57	3.60	5.782	5.107	4.678	4.383
Productivity per dollar of labor (boxes):[2]													
Packingline workers and supervisor	1.06	3.06	0.87	3.37	0.70	2.59	1.72	1.94	2.00	1.265	1.389	1.860	2.240
Productivity per hour of labor (boxes):[3]													
Packingline workers and supervisor	3.55	10.26	2.92	13.47	2.33	10.34	5.79	7.14	7.47	4.57	7.09	8.70	9.82

[1]Based on an economic-engineering methodology study and survey data of six cooperatives.
[2]Reflects average annual units of output, divided by average annual wages paid to packingline workers and supervisor.
[3]Reflects average annual units of output, divided by average annual work-hours by packingline workers and supervisor.

the model operation. The cooperatives packingline workers averaged slightly above minimum wage. In the case for model workers, packingline foremen were paid $7 and workers $4 per hour (table 3).

Productivity per dollar of packingline labor, including onsite foreman, shows the number of boxes that are packed for each dollar spent on labor. Productivity per dollar of labor ranged from a low of 0.70 box in 1986 to a high of 3.37 boxes in 1985. The average productivity per dollar of labor was about two boxes in 1984-86. This compares with the economic-engineering model operation of 1.26 boxes per dollar of labor at 10,000 annual units of output, and 2.2 boxes at 100,000 units.

Productivity per hour of labor is the number of boxes of produce packed per individual work-hour. The range indicates a wide variance in the utilization of labor, with a low of 2.33 boxes in 1986 to a high of 13.47 boxes in 1985. Average number of boxes per individual work-hour were about six in 1984 and seven in 1985 and 1986. Productivity per individual work-hour for the model operation ranged from 4.57 boxes at 10,000 units of output to 9.82 boxes at 100,000 units of output annually.

In comparison, data show the average productivity per dollar of labor and per individual work-hour is less than for the economic-engineering model operation. However, the high range indicates a better performance level than the model operation, even at the 100,000 annual level of output.

Cooperative per unit labor cost was determined by dividing the wages and FICA paid packingline workers, by the total number of units packed. Salaries for managers, the bookkeeper, and the secretary were not included. However, if the manager's time was shared between packingline and administrative operations, a percentage of the salary was allocated to packingline cost.

Table 5—Three-year average overhead cost for six vegetable cooperatives by type of facility, 1984-86[1]

Item	Facility owned	Facility rented
	Cents	
Overhead		
Repair & maintenance	0.066	0.035
Cost of using building[2]	.039	.071
Equipment depreciation	.103	.035
Equipment rental	.025	.001
Miscellaneous	.034	.021
Total	.267	.163

[1]Data based on financial statements provided by cooperatives and reflects cooperatives that owned or rented packingsheds.
[2]Reflects depreciation on buildings or rent paid for use of facilities.

Overhead Costs

Data from the study show that overhead costs, such as repair and maintenance, cost of using building, equipment depreciation, and equipment rental, accounted for between 10-11 percent of total packingline costs for the period. Per unit (box) overhead cost was $0.18 to $0.21 for the same period.

Many factors influence cooperative packingline overhead costs, such as whether the facilities are owned or rented, and the age and quality of facilities and equipment. Generally, in the short run, there are reasons to assume that cooperatives that own their facilities will have a higher per unit overhead cost than those that rent, mainly due to depreciation expenses. However, in the long run, per unit overhead costs for owned facilities will decrease and may be equal to or lower than rented facilities. It should be noted that depreciation is not a cash expense. Therefore, money does not leave the cooperative's treasurer as is the case with renting.

Based on the 3-year average data presented in table 5, per unit overhead cost is higher for cooperatives who owned their facilities than it is for those that rented facilities, $0.27 to $0.16, respectively.

Age and quality of facilities affect both overhead and packingline labor costs. Old facilities require more frequently and costly repair and maintenance. It could also mean longer downtime that results in an increase in per unit packingline labor cost. In these situations, management must decide if increased overhead costs from repair and maintenance and lost labor time justify replacing old facilities.

Utility Cost and Usage

Utilities, which includes electricity and water, is an important cost variable in operating a fresh vegetable packingshed, but represents a small percentage of total cost. Based on survey data, utility costs averaged less than 2 percent of total facility operating cost and less than $0.03 per box of produce packed.

It should be noted that some cooperatives were not fully equipped to provide the maximum amount of water, waxing, and cooling services. Also, some cooperatives maintained utility service year round, while others discontinued service at the end of the packing season.

Electricity—Electrical power for the packingline and cooler represented the largest share of the utility cost. All cooperatives, except one, reported operating an onsite cooler storage area. The cooperative without a cooler storage area used refrigerated trucks to store and cool packed produce. The cost of electricity for each cooperative was related to length of the operating season (days), size of cooler units, and rate per kilowatt-hour (kwh).

The total amount of kwh used by each cooperative was not available. However, those that maintained records reported electricity usage ranging from a low of about 8,000 kwh to a high of 70,000 kwh. Rates charged per kwh varied by cooperative and were set by local electric utility companies. These rates ranged from $0.034 to $0.113 per kwh (table 6).

Water—Packingline operations used the largest share of water for washing and waxing produce. Volume of water is based on type and quantity of produce handled, length of season,

Table 6—Utility rates paid by six fresh vegetable cooperatives, 1986[1]

Cooperatives	Electricity kwh	Water Gals./m
	Dollars	
1	0.113	2.36
2	.072	2.39
3	.070	2.73
4	.060	2.76
5	.074	2.43
6	.034	2.00

[1]Based on data obtained from cooperatives and local utility companies.

and design efficiency of the line. Only two cooperatives reported complete data on the volume of water for the 3-year period, 1984-86. Consumption ranged from 82,051 to 350,000 gallons per year.

Water costs are determined by local utility companies. Rates vary by location and range from $2 to $2.76 per thousand gallons (table 6).

Administrative Costs

Administrative costs are those associated with the total management functions of the cooperative, excluding manufacturing and production. In 1984-86, administrative costs averaged 15-19 percent of total operating costs and a range among the six cooperatives between 7.6 percent to 34.5 percent. On a per unit basis, administrative costs averaged between $0.27 and $0.36 and ranged from $0.154 to $1.799 (tables 1-2 and figs. 7-8).

Salaries and FICA for the manager, bookkeeper, and secretary accounted for 9-11 percent of administrative cost, which averaged about $0.16 to $0.21 per unit for the 3 years. The range in per unit administrative salaries and FICA was $0.05 to $0.91. Insurance and telephone were next, with a cost of less than $0.04 per unit.

Other Factors in Packingline Costs

Packingline costs are affected by other factors, such as scheduling produce for delivery to the packingshed, quantity, and quality of produce packed. Produce should be scheduled for delivery to most effectively utilize labor. Also, if growers deliver high-quality produce to the packingshed, the number of pack-out units per individual work-hour should increase, thus reducing the per unit labor cost.

Scheduling Produce

Procedures used by cooperatives to schedule produce to packingshed are important.

The cooperatives used basically two different procedures. (1) The cooperative representative contacted growers several days in advance to determine the quantity and quality of produce available for delivery at a specified time, and (2) scheduled produce for delivery to the packingshed by type of commodity. Since most of the cooperatives graded and packed two or more commodities, this procedure reduced the number of times needed to change over the packingline. Four of the six cooperatives reported a changeover for another commodity at least once per day, with downtime of 5-15 minutes.

Regardless of scheduling procedures, packingline workers had idle time. To minimize this, several cooperative managers reportedly started the grading and packing operation 3-4 hours after sufficient volume of produce had been delivered.

The disadvantage of this operation is that ungraded produce takes up space needed for operating the packingline and the quality of the produce is reduced when left exposed to heat for a long time. However, the majority of cooperatives had packingline workers on site when produce was delivered.

Quantity and Quality of Produce Packed

Quantity and quality of produce delivered to the packingshed and packed for sale have a direct affect on the cooperative's operating costs.

Based on estimates from the managers of these six cooperatives, all produce delivered to

Figure 7—Share of Administrative Operating Cost, Range, and Average

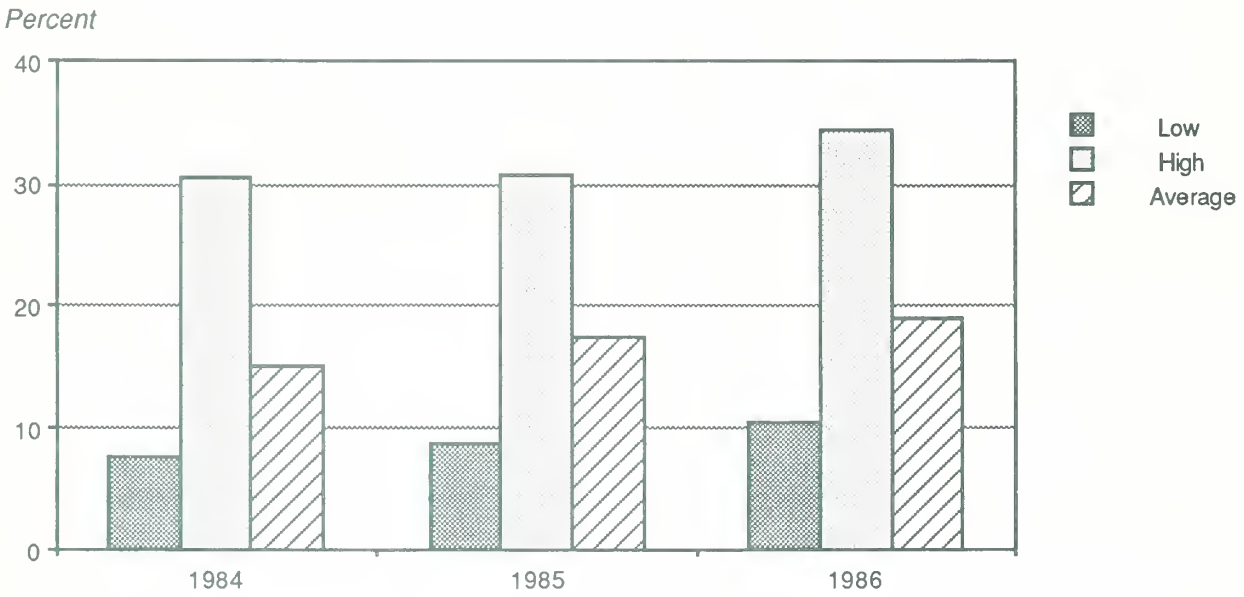


Figure 8—Per Unit Administrative Operating Cost, Range, and Average

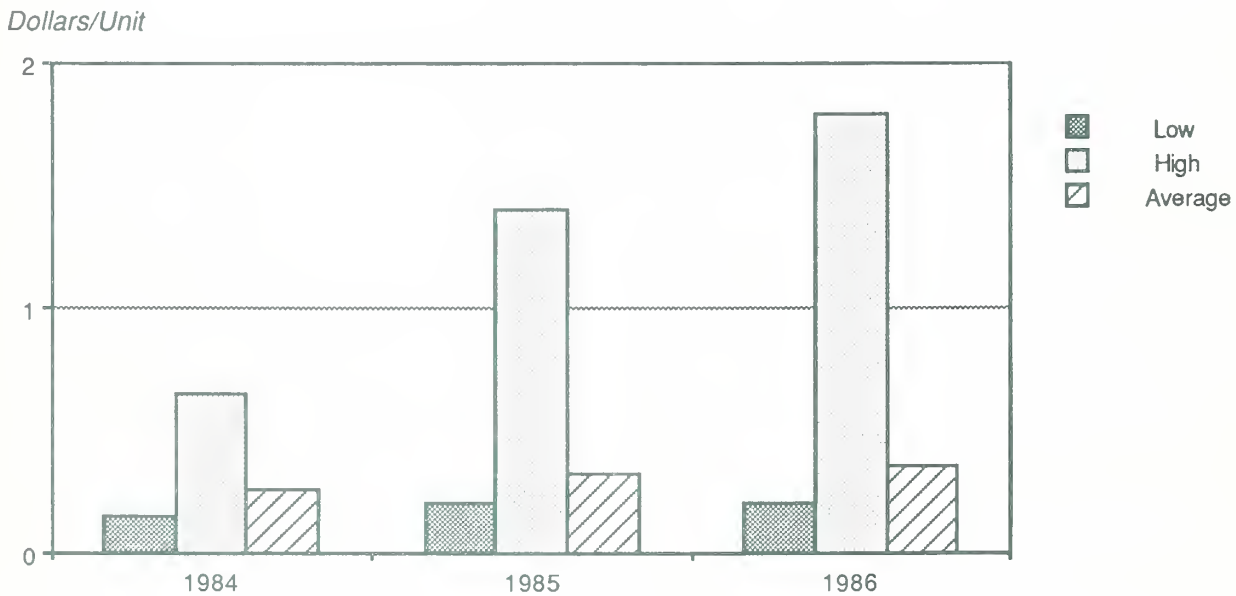


Table 7—Average per unit cost by size of operation[1]

Year	Number of boxes packed	
	100,000 or more	Less than 100,000
	Dollars	
Packingline cost		
1984	1.614	0.960
1985	1.483	1.829
1986	1.466	1.870
Average	1.521	1.553
Administrative cost		
1984	0.259	0.333
1985	.259	.707
1986	.285	.822
Average	.268	.621
Total operating cost		
1984	1.873	1.293
1985	1.742	2.536
1986	1.751	2.692
Average	1.789	2.174

[1]Based on survey data of five cooperatives in 1984 and six in 1985 and 1986.

the packingshed and packed for sale ranged from 69 to 90 percent. Also, produce packed for sale, and graded as No. 1 or premium, ranged from 50 to 70 percent for the 3-year period, 1984-86. The assumption is, as the percentage of produce packed and graded as No. 1 or premium increase, average per unit packingline cost would decrease.

Pack-out ratios for the quantity and quality are important in measuring the packingline performance. Therefore, a special effort should be made to see that these records are maintained and used. Pack-out ratios not only impact on operating cost, but also may provide some insight on producers' needs. A low pack-out ratio for a cooperative may be an indication that producers need assistance related to culture practices and field grading of produce.

Size of Operation

Due to the limited number of cooperatives participating in the study (6), it is difficult to determine exactly how the size of an operation (volume) affects total per unit cost. However, the six were divided into two groups: three with pack-out of 100,000 or more boxes and three with less than 100,000 boxes. Based on a 3-year average data (1984-86), the group of cooperatives with 100,000 or more boxes had a lower total per unit operating cost than those with less than 100,000 boxes, with an average cost of $1.79 and $2.18, respectively (table 7).

Two previous studies on small fresh vegetables packingline operations showed similar results. The economic-engineering methodology study titled An Economic Analysis of the Feasibility of Fresh Vegetable Packinghouse Operations in Tennessee [1] showed that increased volume decreased average operating per unit cost.

The second study, Determining Commercial Marketing and Production Opportunities for Small Farm Vegetable Growers, [2] also based on an economic-engineering model, showed per unit operating costs of a small permanently sited packingline at various units of output. Based on results from the above study, as units of output increased from 10,000 to 100,000, per unit costs decreased from $2.9006 to $1.3749, respectively.

Type and Number of Commodities

Identifying fresh vegetable packingline operating costs by type of commodities graded and packed at the packingshed is not an easy undertaking. Cooperative managers should be aware that each type of commodity requires different technology, handling skills, and time in the grading and packing process. Because of size and perishability of commodities, some will have higher per unit packingline costs than others.

The same is true regarding the number of commodities packed at a shed. As the number of different commodities increases, so will the amount of downtime needed to change over the packingline. In some situations, additional commodities are needed to increase volume in order to sustain the packing operation. However, the cost involved in grading and packing too many different commodities can outweigh any gain realized from additional volume.

Table 8—Average per unit cost by number of commodities packed[1]

Year	Number of commodities		
	1	2	3
	Cents		
Packingline cost			
1984	0.815	1.575	1.563
1985	1.286	1.944	1.306
1986	1.165	2.220	1.674
Average	1.089	1.913	1.514
Administrative cost			
1984	0.359	0.208	0.656
1985	.572	.536	.437
1986	.454	.776	.671
Average	.461	.507	.588
Total operating cost			
1984	1.174	1.783	2.219
1985	1.858	2.480	1.743
1986	1.619	2.996	2.345
Average	1.550	2.420	2.102

[1]Based on survey data of five cooperatives in 1984 and six in 1985 and 1986.

Table 8 shows the results based on number of commodities packed. Cooperatives that packed one commodity or three commodities had a lower average per unit operating cost than those with two commodities. The results don't mean that a one- or three-commodity operation has an advantage over other operations, but managers should be aware that the number of commodities packed can affect per unit costs and that each commodity has a different packing cost. If a cooperative is packing more than one commodity, packing cost should be charged for each commodity.

Income to Finance Packing Operations

Income generated by the cooperatives to pay packingline and administrative costs comes from packing fees. Packing fees are based on a projected operating budget for the current year. The amount of the fees are usually assessed on a per unit basis. However, several cooperatives at various times have used percent-of-gross sales and operating-at-cost methods.

Table 9—Range and average packing fees per box for six fresh vegetable cooperative packingshed operations[1]

Item	Range						Average for six cooperatives		
	1984		1985		1986		1984	1985	1986
	Low	High	Low	High	Low	High			
					Dollars				
Bell peppers	1.60	2.50	1.60	2.50	1.60	2.50	2.15	2.15	2.15
Tomatoes	1.70	2.10	1.85	2.25	1.85	2.20	1.93	2.08	2.02
Cucumbers	2.00	2.50	2.00	2.50	2.00	2.50	2.25	2.25	2.25
Cabbage	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60
Average all commodities:									
Packing fees							2.11	2.15	2.14
Operating cost							1.80	1.86	1.88

[1]Based on survey of five cooperatives in 1984 and six in 1985 and 1986.

Table 9 shows the range and average per unit packing fees levied by the cooperatives. Cucumbers had the highest average fee of $2.25 per box, and cabbage had the lowest fee of $1.60. In 1984-86, the average fee for all commodities ranged from $2.11 to $2.15, while the average per unit operating cost ranged from $1.80 to $1.88. Data show that average packing fees are high enough to pay operating cost. For several individual cooperatives, however, packing fees didn't cover operating costs and were adjusted at the end of each marketing season.

Standards for Measuring Cooperative Performance

As with other businesses, cooperative managers need tools to measure the performance of their operation. Several measures have been developed and presented in table 6 to assist managers of packing facilities in monitoring operating costs, specifically cost associated with operating the packingline.

Cost distribution components presented in table 1 and figure 1, per unit cost measures in table 2, and productivity per dollar and per hour of labor as shown in table 4 are standard measures that can be used by managers as an operational and performance instrument. The standard measures presented in this study are commonly used by processing and manufacturing industries to measure performance, but they are seldom used by small fresh vegetable cooperatives.

Analysis of Data

The analysis of data is limited because of the small number of cooperatives included in the study and the short period of time these types of associations have been in operation on a commercial level.

Operating cost data were collected, tabulated, and analyzed over the 3-year period. Cost performance measures and standards were developed based on the analysis of data from cooperatives and the economic-engineering methodology model.

Although the measures may be limited, cooperative managers can use them to evaluate the business operation. As more small fresh vegetable cooperatives are identified and additional data become available, these measures can be improved. Cooperatives participating in this study are encouraged to improve their recordkeeping methods, which will enable them to improve their own performance measures and will provide them with more useful data for expanding performance measures.

References

[1] Broker, John R. and Thomas H. King. " An Economic Analysis of the Feasibility of Fresh Vegetable Packinghouse Operations in Tennessee," University of Tennessee, Knoxville, Agricultural Experiment Station Bulletin 577, May 1977.

[2] Runyan, Jack L. and Joseph P. Anthony, Jr. " Determining Commercial Marketing and Production Opportunities for Small Farm Vegetable Growers,"

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U.S. Department of Agriculture
Agricultural Cooperative Service
P.O. Box 96576
Washington, D.C. 20090-6576

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